



Millennium Expansion Project

Environmental Impact Statement

TABLE OF CONTENTS

TABLE OF CONTENTS

1.0	INTRODUCTION	1-1
1.1	THE MEP	1-1
1.1.1	Project Description	1-1
1.1.2	Project Proponent.....	1-2
1.1.3	Project Objectives and Scope	1-2
1.2	THE ENVIRONMENTAL IMPACT ASSESSMENT PROCESS.....	1-3
1.2.1	Purpose of the EIS	1-3
1.2.2	Objectives of the EIS.....	1-3
1.2.3	Structure of the EIS.....	1-4
1.2.4	Study Team	1-4
1.2.5	Public Consultation Process and Submissions	1-4
2.0	REGULATORY APPROVALS	2-1
2.1	ENVIRONMENTAL IMPACT STATEMENT (EIS) PROCESS	2-1
2.1.1	Methodology	2-1
2.1.2	Objectives	2-1
2.1.3	Submissions.....	2-1
2.2	RELEVANT LEGISLATION AND POLICY REQUIREMENTS	2-2
2.2.1	Commonwealth.....	2-2
2.2.2	State	2-2
2.2.3	Energy Efficiency Opportunities Act 2006	2-3
2.2.4	Environment Protection and Biodiversity Conservation Act 1999	2-3
2.2.5	National Greenhouse and Energy Reporting Act 2007	2-4
2.2.6	Native Title Act 1993.....	2-4
2.2.7	Aboriginal Cultural Heritage Act 2003	2-4
2.2.8	Coal Mining Safety and Health Act 1999.....	2-4
2.2.9	Environmental Protection Act 1994.....	2-5
2.2.10	Environmental Protection Regulations 2008	2-5
2.2.11	Environmental Protection Policies	2-6
2.2.12	Explosives Act 1999.....	2-7
2.2.13	Sustainable Planning Act 2009	2-7
2.2.14	Land Protection (Pest and Stock Route Management) Act 2002	2-8
2.2.15	Mineral Resources Act 1989.....	2-8
2.2.16	Mineral Resources Regulation 2003	2-8
2.2.17	Nature Conservation Act 1992.....	2-9
2.2.18	Nature Conservation (Wildlife) Regulation 2006.....	2-9
2.2.19	Petroleum and Gas (Production and Safety) Act 2004	2-9

2.2.20	Queensland Heritage Act 1992	2-9
2.2.21	Transport Infrastructure Act 1994	2-9
2.2.22	Transport Operation (Road Use Management) Act 1995	2-10
2.2.23	Transport Planning and Coordination Act 1994	2-10
2.2.24	Vegetation Management Act 1999	2-10
2.2.25	Water Act 2000.....	2-10
2.2.26	Summary of Legislation Requirements.....	2-11
2.3	PROJECT APPROVALS	2-13
2.3.1	Approval Timeframe	2-13
2.4	PLANNING PROCESS AND STANDARDS	2-13
2.4.1	Mackay Region ACC Strategic Regional Plan (2007-2010)	2-13
2.4.2	Isaac Regional Council Transition Plan 2008	2-14
2.4.3	Transport Operations (Road Use Management – Road Rules) Regulation 1995 (Queensland Road Rules).....	2-14
2.4.4	Water Resources (Fitzroy Basin) Plan 1999	2-14
2.5	STATE PLANNING POLICIES	2-14
2.5.1	SPP 1/92–Development and the Conservation of Agricultural Land	2-14
2.5.2	SPP 1/03–Mitigating the Adverse Impacts of Flood, Bushfire and Landslide.....	2-15
2.5.3	SPP2/07 Protection of Extractive Resources and Guideline	2-15
2.5.4	SPP 1/07 Housing and Residential Development Including Guideline 1.0	2-15
2.6	ACCREDITED PROCESS FOR CONTROLLED ACTIONS UNDER COMMONWEALTH LEGISLATION	2-16
3.0	PROJECT NEEDS AND ALTERNATIVES.....	3-1
3.1	PROJECT JUSTIFICATION	3-1
3.1.1	Economic Benefits	3-2
3.1.2	Social Benefits.....	3-2
3.1.3	Project Alternatives.....	3-3
3.1.4	Ecologically Sustainable Development Principles	3-4
3.1.5	Viability of the MEP	3-4
3.1.6	Alternative Mining Methods.....	3-5
3.1.7	Alternative Workforce Accommodation	3-6
3.1.8	Alternative Tailings Disposal Options.....	3-6
3.1.9	Consequences of Not Proceeding with the MEP	3-6
3.2	REFERENCES	3-8
4.0	PROJECT DESCRIPTION	4-1
4.1	LOCATION.....	4-1
4.1.1	Regional Context.....	4-1
4.1.2	Local Context.....	4-1
4.2	CONSTRUCTION.....	4-1
4.2.1	Relocate Electricity Transmission Line and Access Road.....	4-1

4.2.2	Clean Water Drain for New Chum Creek Drainage.....	4-2
4.2.3	Upgrade of CHPP.....	4-2
4.2.4	New Water Storages	4-6
4.3	OPERATIONS	4-7
4.3.1	Tenements and Tenures.....	4-7
4.3.1.1	<i>MEP Tenements and Tenures</i>	<i>4-8</i>
4.3.2	Resource Base and Mine Life	4-8
4.3.2.1	<i>Full Utilisation of Resources</i>	<i>4-10</i>
4.3.3	Mining Methods and Equipment.....	4-11
4.3.4	Mine Sequencing.....	4-13
4.3.5	Workforce	4-13
4.3.5.1	<i>Construction Phase.....</i>	<i>4-13</i>
4.3.5.2	<i>Operational Phase.....</i>	<i>4-13</i>
4.3.5.3	<i>Decommissioning Phase.....</i>	<i>4-13</i>
4.3.6	Processing and Products.....	4-14
4.3.7	Ongoing Evaluation and Exploration Activities	4-14
4.4	PRODUCT HANDLING	4-16
4.5	INFRASTRUCTURE REQUIREMENTS	4-17
4.5.1	Transport	4-17
4.5.1.1	<i>Road</i>	<i>4-17</i>
4.5.1.2	<i>Rail</i>	<i>4-17</i>
4.5.1.3	<i>Ship</i>	<i>4-19</i>
4.5.2	Energy	4-19
4.5.3	Water Supply, Demand and Storage	4-19
4.5.4	Stormwater Drainage.....	4-20
4.5.5	Sewerage	4-21
4.5.6	Telecommunications.....	4-21
4.5.7	Accommodation and Other Infrastructure	4-21
4.6	WASTE MANAGEMENT	4-22
4.6.1	Air Emissions.....	4-22
4.6.2	Excavated Waste	4-22
4.6.3	Tailings.....	4-23
4.6.4	Solid and Liquid Waste Disposal.....	4-23
4.7	REHABILITATION AND DECOMMISSIONING	4-24
4.7.1	Topsoil Management.....	4-24
4.7.2	Areas Suitable for Grazing.....	4-24
4.7.3	Areas Not Suitable for Grazing	4-25
4.7.4	Erosion and Sediment Control.....	4-25
4.7.5	Decommissioning.....	4-26

4.7.5.1	Waste Rock Emplacements	4-26
4.7.5.2	Final Voids and Ramps	4-26
4.7.5.3	Infrastructure	4-26
4.7.5.4	Final Land Use	4-26
5.0	REHABILITATION AND DECOMMISSIONING	5-1
5.1	EXECUTIVE SUMMARY	5-1
5.1.1	Environmental Values	5-1
5.1.2	Issues.....	5-1
5.1.3	Mitigation Strategies.....	5-2
5.1.3.1	Rehabilitation Design.....	5-2
5.1.3.2	Landform Design.....	5-3
5.1.3.3	Rejects Management.....	5-3
5.1.3.4	Topsoil Management.....	5-3
5.1.3.5	Revegetation Methods.....	5-4
5.1.3.6	Erosion Control Measures	5-4
5.1.3.7	Flood Control.....	5-4
5.1.3.8	Final Rehabilitation and Decommissioning	5-4
5.2	GUIDELINES AND OBJECTIVES.....	5-5
5.3	MINING PROCESSES	5-5
5.3.1	Land Disturbance and Clearing	5-6
5.3.2	Topsoil Salvage.....	5-6
5.3.3	Mining Operations	5-7
5.3.3.1	Overburden Characteristics.....	5-7
5.3.3.2	Coal Rejects.....	5-8
5.3.3.3	External Waste Rock Emplacements.....	5-9
5.3.3.4	Internal Waste Rock Emplacements.....	5-10
5.3.3.5	Infrastructure	5-10
5.4	REHABILITATION PROCESSES	5-10
5.4.1	Design Criteria	5-10
5.4.2	Progressive Rehabilitation	5-11
5.4.2.1	Progressive Plan-2011.....	5-12
5.4.2.2	Progressive Plan-2012.....	5-12
5.4.2.3	Progressive Plan-2015.....	5-12
5.4.2.4	Progressive Plan-2020.....	5-12
5.4.2.5	Progressive Plan-2027.....	5-12
5.4.3	Standard Rehabilitation Processes.....	5-18
5.4.3.1	Shaping and Contouring.....	5-18
5.4.3.2	Topsoil Spreading.....	5-18
5.4.3.3	Seeding	5-18

5.4.4	Specific Rehabilitation Processes	5-19
5.4.4.1	Sediment Control and Erosion.....	5-19
5.4.4.2	Flood Mitigation	5-20
5.4.4.3	Geotechnical Stability	5-21
5.5	DECOMMISSIONING	5-21
5.5.1	Exploration Areas	5-21
5.5.2	External and Internal Waste Rock Emplacements.....	5-21
5.5.3	Final Low Wall, Voids and Ramps	5-21
5.5.4	Water Management Structures	5-22
5.5.5	Drainage.....	5-22
5.5.6	Access/Haul Roads	5-23
5.5.7	Overhead Powerlines.....	5-23
5.5.8	Waste Disposal	5-23
5.6	MONITORING AND SUCCESS CRITERIA	5-23
5.6.1	Native Bushland	5-24
5.6.2	Grassland Suitable for Grazing.....	5-25
5.7	POST-MINE LAND USE	5-25
5.8	REFERENCES	5-28
6.0	CLIMATE	6-1
6.1	INTRODUCTION	6-1
6.2	EXTREME EVENTS.....	6-3
6.2.1	Cyclones/Flooding	6-4
6.2.2	Bushfires.....	6-4
6.2.3	Landslides.....	6-5
6.2.4	Earthquakes.....	6-5
6.3	REFERENCES	6-6
7.0	LAND RESOURCES	7-1
7.1	EXECUTIVE SUMMARY.....	7-1
7.1.1	Values.....	7-1
7.1.2	Issues.....	7-1
7.1.3	Mitigation Strategies.....	7-2
7.2	EXISTING ENVIRONMENT	7-3
7.2.1	Tenure.....	7-3
7.2.2	Topography	7-3
7.2.3	Geology.....	7-4
7.2.3.1	Tertiary Material.....	7-5
7.2.3.2	Rangal Coal Measures	7-5
7.2.3.3	Coal Resource	7-6
7.2.3.4	Coal Quality	7-7

7.2.4	Land Use	7-7
7.2.5	Sensitive Environmental Areas.....	7-7
7.2.6	Landscape Character.....	7-7
7.3	SOILS, LAND SUITABILITY AND LAND CONTAMINATION.....	7-7
7.3.1	Soil survey Methodology	7-7
7.3.1.1	<i>Desktop Study and Survey Design</i>	<i>7-7</i>
7.3.1.2	<i>Fieldwork.....</i>	<i>7-8</i>
7.3.1.3	<i>Land Suitability Assessment</i>	<i>7-9</i>
7.3.2	Pre-Mine Land Suitability Assessment	7-16
7.3.2.1	<i>Mining Guideline.....</i>	<i>7-16</i>
7.3.2.2	<i>Planning Guideline.....</i>	<i>7-20</i>
7.3.3	Land Contamination.....	7-21
7.3.3.1	<i>Existing Land Contamination</i>	<i>7-21</i>
7.3.3.2	<i>Potential for Contamination.....</i>	<i>7-21</i>
7.4	OVERBURDEN AND COAL REJECTS CHARACTERISATION.....	7-22
7.4.1	Methodology.....	7-22
7.4.1.1	<i>pH and Salinity</i>	<i>7-22</i>
7.4.1.2	<i>Acid-Base Accounting</i>	<i>7-22</i>
7.4.1.3	<i>Metal Enrichment and Water Extract Analysis.....</i>	<i>7-23</i>
7.4.1.4	<i>Sample Selection</i>	<i>7-23</i>
7.4.2	Geochemical Results.....	7-24
7.4.2.1	<i>pH and Salinity</i>	<i>7-24</i>
7.4.2.2	<i>Acid Forming Characteristics.....</i>	<i>7-24</i>
7.4.2.3	<i>Metal Enrichment and Solubility.....</i>	<i>7-26</i>
7.5	VISUAL AMENITY	7-27
7.5.1	Legislation/Guidelines.....	7-27
7.5.2	Methodology.....	7-27
7.5.2.1	<i>Desktop Study and Field Observations.....</i>	<i>7-27</i>
7.5.2.2	<i>Local Council Designations.....</i>	<i>7-27</i>
7.5.2.3	<i>Development of Photographic Montages with Predicted Mine Contour</i>	<i>7-28</i>
7.5.2.4	<i>Landscape and Visual Impact Assessment.....</i>	<i>7-28</i>
7.5.3	Landscape Assessment	7-28
7.5.3.1	<i>Existing Land Use</i>	<i>7-28</i>
7.5.3.2	<i>Natural Factors.....</i>	<i>7-29</i>
7.5.3.3	<i>Social and Cultural Factors</i>	<i>7-29</i>
7.5.3.4	<i>Landscape Sensitivity.....</i>	<i>7-29</i>
7.5.4	Visual Assessment	7-30
7.5.4.1	<i>Existing Visual Elements.....</i>	<i>7-30</i>
7.5.4.2	<i>Viewpoint Sensitivity.....</i>	<i>7-32</i>

7.6	POTENTIAL IMPACTS AND MITIGATION MEASURES.....	7-37
7.6.1	Resource Utilisation.....	7-37
7.6.2	Post Mine Land Suitability.....	7-37
7.6.2.1	<i>Rainfed Cropping</i>	7-37
7.6.2.2	<i>Cattle Grazing</i>	7-37
7.6.3	Subsidence.....	7-39
7.6.4	Land Disturbance.....	7-39
7.6.6	Topsoil Management.....	7-40
7.6.6.1	<i>Topsoil Stripping</i>	7-40
7.6.6.2	<i>Handling and Storage of Topsoil</i>	7-40
7.6.7	Erosion and Stability.....	7-42
7.6.7.1	<i>Erosion Potential</i>	7-42
7.6.7.2	<i>Erosion Mitigation</i>	7-42
7.6.7.3	<i>Erosion Monitoring</i>	7-44
7.6.8	Land Contamination.....	7-44
7.6.8.1	<i>Notifiable Activities</i>	7-44
7.6.8.2	<i>Waste and Hazardous Waste Management</i>	7-45
7.6.8.3	<i>Waste Rock Management</i>	7-45
7.6.8.4	<i>Rejects Management</i>	7-45
7.6.9	Visual Amenity Impacts.....	7-46
7.6.9.1	<i>Impact Generators</i>	7-46
7.6.9.2	<i>Landscape Character and Visual Amenity</i>	7-46
7.6.9.3	<i>Visual Impact</i>	7-47
7.6.9.4	<i>Visual Amenity Mitigation and Management</i>	7-51
7.6.10	Cumulative Impacts.....	7-52
7.7	REFERENCES	7-54
8.0	TRANSPORT	8-1
8.1	EXECUTIVE SUMMARY	8-1
8.1.1	Values	8-1
8.1.2	Issues.....	8-1
8.1.3	Mitigation Strategies.....	8-1
8.2	INTRODUCTION	8-1
8.3	ENVIRONMENTAL VALUES	8-2
8.4	LEGISLATION AND GUIDANCE	8-2
8.4.1	Information and Communications.....	8-2
8.4.2	Transport Infrastructure Act 1994	8-2
8.4.3	Transport Operation (Road Use Management) Act 1995	8-2
8.4.4	Transport Planning and Coordination Act 1994	8-3
8.4.5	Guidelines for Assessment of Road Impacts of Developments.....	8-3

8.5	ROAD	8-3
8.5.1	Existing Road Infrastructure and Transport Movements.....	8-3
8.5.1.1	State Controlled Roads	8-3
8.5.1.2	Local Roads.....	8-7
8.5.1.3	Private Roads	8-8
8.5.2	Road Transport Generated by the MEP	8-8
8.5.2.1	Summary of Assumptions for Determining MEP Impacts	8-8
8.5.2.2	Heavy Vehicle Movements	8-8
8.5.2.3	BIBO and Light Vehicle Movements	8-13
8.5.3	Potential Impacts.....	8-15
8.5.3.1	Link Impacts.....	8-15
8.5.3.2	Intersection Impacts.....	8-16
8.5.3.3	Pavement Impact.....	8-19
8.5.3.4	Environmental Impacts.....	8-20
8.5.4	Potential Mitigation Measures.....	8-20
8.6	RAIL	8-21
8.6.1	Existing Rail Infrastructure and Transport Movements.....	8-21
8.6.1.1	Passenger Rail.....	8-21
8.6.1.2	Commercial Rail	8-21
8.6.2	Rail Transport Generated by the MEP.....	8-22
8.6.3	Potential Impacts.....	8-22
8.6.4	Potential Mitigation Measures.....	8-22
8.7	AIR	8-23
8.7.1	Existing Infrastructure and Transport Movements.....	8-23
8.7.2	Air Transport Generated by the MEP	8-23
8.7.3	Potential Impacts.....	8-23
8.7.4	Potential Mitigation Measures.....	8-23
8.8	SEA	8-24
8.8.1	Existing Infrastructure and Transport Movements.....	8-24
8.8.2	Sea Transport Generated by the MEP	8-24
8.8.3	Potential Impacts.....	8-24
8.8.4	Potential Mitigation Measures.....	8-25
8.9	IMPACTS TO OTHER TRANSPORT NETWORKS.....	8-25
8.10	CUMULATIVE IMPACTS	8-25
8.11	REFERENCES	8-28
9.0	WASTE MANAGEMENT.....	9-1
9.1	EXECUTIVE SUMMARY	9-1
9.1.1	Values.....	9-1
9.1.2	Issues.....	9-1

9.1.3	Mitigation Strategies.....	9-1
9.1.3.1	General	9-1
9.1.3.2	Waste Minimisation, Re-use and Recycling.....	9-1
9.1.3.3	Waste Transport, Disposal and Tracking	9-2
9.1.3.4	Spill Response and Reporting.....	9-2
9.1.3.5	Waste Monitoring and Reporting.....	9-2
9.1.3.6	Runoff and Waste Water	9-2
9.1.3.7	Waste Rock and Rejects.....	9-3
9.1.3.8	Regulated Wastes.....	9-3
9.1.3.9	Tyres	9-3
9.1.3.10	Chemicals and Hydrocarbons.....	9-3
9.1.3.11	Solid Waste	9-3
9.2	WASTE MANAGEMENT VALUES.....	9-4
9.3	WASTE MANAGEMENT LEGISLATION AND REGULATIONS	9-5
9.3.1	Waste Management Principles.....	9-5
9.4	POTENTIAL IMPACTS AND MITIGATION MEASURES	9-5
9.5	CUMULATIVE IMPACTS	9-16
9.5.1	Moranbah Landfill.....	9-16
9.5.2	Recycling Facilities.....	9-16
9.5.3	Regulated Waste Facilities.....	9-16
9.5.4	Sewage Treatment Facilities.....	9-16
9.5.5	Summary of Cumulative Impacts.....	9-17
9.6	WASTE MANAGEMENT STRATEGIES	9-17
9.6.1	Cleaner Production	9-21
9.6.2	Regulated Wastes.....	9-22
9.6.3	Waste Tracking	9-23
9.6.4	Monitoring Program.....	9-24
9.6.5	Waste Reporting	9-24
9.7	REFERENCES.....	9-26
9.8	ANNEXURE A – MILLENNIUM MINE COAL PROCESSING SUMMARY	9-27
10.0	WATER RESOURCES	10-1
10.1	EXECUTIVE SUMMARY	10-1
10.1.1	Values.....	10-1
10.1.2	Issues.....	10-1
10.1.3	Mitigation Strategies.....	10-2
10.2	BACKGROUND	10-3
10.2.1	Surface Water.....	10-3
10.2.2	Groundwater	10-3
10.3	LEGISLATION AND GUIDELINES.....	10-4

10.4	ENVIRONMENTAL VALUES	10-4
10.4.1	Surface Water.....	10-4
10.4.1.1	<i>Ephemeral Creek System Consideration.....</i>	<i>10-4</i>
10.4.2	Groundwater	10-5
10.5	EXISTING NATURAL ENVIRONMENT	10-5
10.5.1	Surface Water.....	10-5
10.5.1.1	<i>Regional Drainage Network.....</i>	<i>10-5</i>
10.5.1.2	<i>Local Drainage Network</i>	<i>10-6</i>
10.5.1.3	<i>Streamflow</i>	<i>10-12</i>
10.5.1.4	<i>Water Quality.....</i>	<i>10-12</i>
10.5.1.5	<i>New Chum Creek Water Quality.....</i>	<i>10-14</i>
10.5.1.6	<i>Existing Land and Water Use</i>	<i>10-16</i>
10.5.1.7	<i>Existing Millennium Mine Operations.....</i>	<i>10-17</i>
10.5.1.8	<i>Flood Modelling for Existing Environment</i>	<i>10-19</i>
10.5.2	Groundwater	10-23
10.5.2.1	<i>Geology</i>	<i>10-23</i>
10.5.2.2	<i>Existing Groundwater Monitoring Network.....</i>	<i>10-25</i>
10.5.2.3	<i>Groundwater Occurrence.....</i>	<i>10-25</i>
10.5.2.4	<i>Groundwater Use.....</i>	<i>10-28</i>
10.5.2.5	<i>Groundwater Quality.....</i>	<i>10-30</i>
10.5.2.6	<i>Groundwater Values</i>	<i>10-32</i>
10.6	POTENTIAL IMPACTS AND MITIGATION MEASURES	10-34
10.6.1	Surface Water.....	10-34
10.6.1.1	<i>Water Management Strategy.....</i>	<i>10-34</i>
10.6.1.2	<i>Surface Water Quality</i>	<i>10-40</i>
10.6.1.3	<i>Surface Water Quantity.....</i>	<i>10-43</i>
10.6.1.4	<i>Potential Flood Impacts and Mitigation</i>	<i>10-45</i>
10.6.1.5	<i>Site Water Balance</i>	<i>10-48</i>
10.6.1.6	<i>Proposed Surface Water Monitoring Program</i>	<i>10-50</i>
10.6.1.7	<i>Post Mining Water Management.....</i>	<i>10-53</i>
10.6.2	Groundwater	10-58
10.6.2.1	<i>Impact Assessment Methodology</i>	<i>10-58</i>
10.6.2.2	<i>Groundwater Inflow and Dewatering Requirements</i>	<i>10-63</i>
10.6.2.3	<i>Potential Impacts on Regional Groundwater Levels during Mining Operations.....</i>	<i>10-64</i>
10.6.2.4	<i>Potential Impacts on Groundwater Quality during Mining Operations.....</i>	<i>10-69</i>
10.6.2.5	<i>Potential Impacts on Groundwater Users during Mining Operations.....</i>	<i>10-71</i>
10.6.2.6	<i>Potential Impact on Riparian Vegetation during Mining Operations.....</i>	<i>10-72</i>
10.6.2.7	<i>Operational Impact Mitigation.....</i>	<i>10-72</i>

10.6.3	Potential Impacts on Groundwater – Post-Mining	10-73
10.6.3.1	<i>Final Void Water Balance Modelling</i>	<i>10-73</i>
10.6.3.2	<i>Potential Impacts on Groundwater Quality Post-Mining</i>	<i>10-73</i>
10.6.3.3	<i>Potential Impacts on Groundwater Levels Post-Mining</i>	<i>10-74</i>
10.6.3.4	<i>Potential Impacts on Groundwater Users Post-Mining</i>	<i>10-76</i>
10.6.3.5	<i>Groundwater Monitoring Program</i>	<i>10-76</i>
10.7	CUMULATIVE IMPACTS	10-79
10.7.1	Surface Water.....	10-79
10.7.2	Groundwater.....	10-79
10.7.2.1	<i>Carborough Downs Mine</i>	<i>10-79</i>
10.7.2.2	<i>Poitrel Mine.....</i>	<i>10-79</i>
10.7.2.3	<i>Daunia Mine.....</i>	<i>10-80</i>
10.8	REFERENCES	10-82
	ANNEXURE A – LEGISLATION AND REGULATORY GUIDELINES	10-84
11.0	AIR QUALITY	11-1
11.1	EXECUTIVE SUMMARY	11-1
11.1.1	Values.....	11-1
11.1.2	Issues.....	11-1
11.1.3	Mitigation Strategies.....	11-1
11.2	BACKGROUND	11-2
11.3	AIR QUALITY GUIDELINES	11-2
11.3.1	Environmental Protection (Air) Policy	11-2
11.3.2	Greenhouse Gas Legislation and Guidelines.....	11-3
11.3.3	DERM Guideline	11-3
11.4	EXISTING ENVIRONMENT.....	11-3
11.4.1	Existing Air Quality and Sensitive Receptors	11-4
11.4.2	Climate and Dispersion Meteorology.....	11-7
11.5	POTENTIAL IMPACTS	11-7
11.5.1	Sources of Air Emissions.....	11-7
11.5.2	Modelling Methodology.....	11-7
11.5.2.1	<i>Dispersion Model.....</i>	<i>11-7</i>
11.5.2.2	<i>Modelling Assumptions and Emissions Estimation</i>	<i>11-8</i>
11.6	MODELLING RESULTS.....	11-8
11.6.1	On-Site Dust Emissions	11-8
11.6.2	Impacts on Sensitive Receptors.....	11-11
11.7	IMPACT ASSESSMENT	11-23
11.7.1	Case 1–Out-of-Pit Dumping until 2015.....	11-23
11.7.2	Case 2–In-Pit Dumping from 2015 until Mine Closure	11-23
11.8	MITIGATION MEASURES.....	11-24

11.9	GREENHOUSE GAS EMISSIONS	11-25
11.9.1	MEP Greenhouse Gas Emissions Predictions.....	11-25
11.9.2	Greenhouse Gas Mitigation Measures.....	11-27
11.9.3	Climate Change Adaptation.....	11-28
11.10	CUMULATIVE IMPACTS	11-28
11.11	REFERENCES	11-30
12.0	NOISE AND VIBRATION	12-1
12.1	EXECUTIVE SUMMARY	12-1
12.1.1	Values.....	12-1
12.1.2	Issues.....	12-1
12.1.3	Mitigation Strategies.....	12-1
12.2	INTRODUCTION	12-2
12.3	LEGISLATION AND GUIDELINES.....	12-2
12.3.1	Environmental Protection Act 1994.....	12-2
12.3.2	Environmental Protection (Noise) Policy 2008.....	12-2
12.3.3	Acoustic Quality Objectives.....	12-2
12.3.3.1	<i>Controlling Background Creep.....</i>	<i>12-3</i>
12.3.4	DERM Ecoaccess Guideline-Low Frequency Noise	12-3
12.3.5	Blasting Noise and Vibration Criteria.....	12-3
12.3.6	Railway Noise Goals.....	12-4
12.3.7	Road Traffic Noise Goals.....	12-4
12.4	EXISTING ENVIRONMENT.....	12-5
12.4.1	Climate	12-5
12.4.2	Noise Sensitive Places	12-5
12.4.3	Baseline Noise Monitoring Data.....	12-7
12.5	NOISE MODELLING	12-7
12.5.1	Modelling Parameters.....	12-7
12.5.2	Noise Modelling Results.....	12-9
12.6	POTENTIAL IMPACTS AND MITIGATION MEASURES.....	12-19
12.6.1	Noise Impacts.....	12-19
12.6.1.1	<i>Mining.....</i>	<i>12-19</i>
12.6.1.2	<i>Railway.....</i>	<i>12-19</i>
12.6.1.3	<i>Road.....</i>	<i>12-20</i>
12.6.2	Blasting impacts.....	12-20
12.6.3	Cumulative Impacts.....	12-23
12.6.4	Mitigation Measures.....	12-23
12.7	REFERENCES	12-24
13.0	NATURE CONSERVATION	13-1
13.1	EXECUTIVE SUMMARY	13-1

13.1.1	Values	13-1
13.1.2	Issues.....	13-1
13.1.3	Mitigation Strategies.....	13-2
13.2	NATURE CONSERVATION VALUES.....	13-2
13.3	TERRESTRIAL FLORA.....	13-3
13.3.1	Fieldwork.....	13-3
13.3.2	Vegetation Communities.....	13-5
13.3.2.1	<i>Currently Mapped Regional Ecosystems</i>	<i>13-5</i>
13.3.2.2	<i>Field Verified Regional Ecosystems.....</i>	<i>13-5</i>
13.3.3	Vegetation Map Unit Descriptions	13-9
13.3.4	Non-Remnant Vegetation	13-9
13.3.5	World Heritage and Wetlands of International Importance.....	13-9
13.3.6	Threatened Ecological Communities.....	13-9
13.3.7	Significant Species.....	13-10
13.3.7.1	<i>Conservation Status.....</i>	<i>13-10</i>
13.3.8	Introduced Species.....	13-28
13.4	TERRESTRIAL FAUNA	13-29
13.4.1	Fieldwork.....	13-29
13.4.2	Habitat Features within the MEP Area	13-30
13.4.2.1	<i>Exotic Grasslands</i>	<i>13-32</i>
13.4.2.2	<i>Woodlands Dominated by Exotic Grasses.....</i>	<i>13-32</i>
13.4.2.3	<i>Native Understorey Woodlands.....</i>	<i>13-32</i>
13.4.2.4	<i>Massive Rock Outcrops.....</i>	<i>13-33</i>
13.4.2.5	<i>Waterway Habitats.....</i>	<i>13-33</i>
13.4.3	Fauna Communities.....	13-34
13.4.3.1	<i>Pest Vertebrates.....</i>	<i>13-34</i>
13.4.3.2	<i>Rare and Threatened Fauna.....</i>	<i>13-35</i>
13.4.3.3	<i>Non-EVR Migratory Vertebrates.....</i>	<i>13-35</i>
13.4.3.4	<i>Ecological Corridors.....</i>	<i>13-36</i>
13.5	AQUATIC BIOLOGY	13-37
13.5.1	Sampling Site Selection	13-37
13.5.2	Methodology.....	13-38
13.5.3	Existing Environment.....	13-38
13.5.3.1	<i>Macrophytes.....</i>	<i>13-38</i>
13.5.3.2	<i>Macroinvertebrates.....</i>	<i>13-39</i>
13.5.3.3	<i>Fish</i>	<i>13-41</i>
13.5.3.4	<i>Other Fauna.....</i>	<i>13-44</i>
13.6	POTENTIAL IMPACTS AND MITIGATION MEASURES	13-44
13.6.1	World Heritage and Wetlands of International Importance.....	13-44

13.6.2	Vegetation Communities and Flora	13-44
13.6.2.1	<i>EVR Species</i>	13-48
13.6.2.2	<i>Introduced Plants</i>	13-48
13.6.3	Terrestrial Fauna Habitats and Communities	13-49
13.6.3.1	<i>EVR Species</i>	13-49
13.6.3.2	<i>Impacts on Migratory Species</i>	13-50
13.6.3.3	<i>Pest Vertebrates</i>	13-50
13.6.3.4	<i>Ecological Corridors</i>	13-51
13.6.4	Potential Impacts on Aquatic Biology	13-51
13.6.4.1	<i>Impacts on Aquatic Macrophytes</i>	13-51
13.6.4.2	<i>Impacts on Aquatic Fauna</i>	13-52
13.6.5	Proposed Offsets.....	13-55
13.6.6	Cumulative Impacts.....	13-57
13.6.6.1	<i>Terrestrial Ecology</i>	13-57
13.6.6.2	<i>Aquatic Ecology</i>	13-57
13.7	REFERENCES	13-59
A-1	ANNEXURE A - MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE, EPBC ACT	A-1
B-1	ANNEXURE B - SPECIES MANAGEMENT PLAN FOR BRIGALOW SCALY-FOOT	B-1
14.0	CULTURAL HERITAGE	14-1
14.1	EXECUTIVE SUMMARY	14-1
14.1.1	Values.....	14-1
14.1.2	Issues.....	14-1
14.1.3	Mitigation Strategies.....	14-1
14.1.4	Description of Cultural Heritage Environmental Values.....	14-1
14.1.5	Cultural Heritage Legislation.....	14-2
14.1.5.1	<i>Commonwealth Legislation</i>	14-2
14.1.5.2	<i>State Legislation</i>	14-2
14.1.6	Cultural Heritage Assessments	14-3
14.1.7	Indigenous Cultural Heritage Baseline Studies.....	14-4
14.1.7.1	<i>Native Title Claims</i>	14-4
14.1.7.2	<i>Heritage Register Search</i>	14-4
14.1.7.3	<i>Previous Indigenous Cultural Heritage Assessments</i>	14-4
14.1.7.4	<i>MEP Indigenous Cultural Heritage Field Survey Methodology</i>	14-4
14.1.7.5	<i>MEP Indigenous Cultural Heritage Field Survey Results</i>	14-6
14.1.8	Non-Indigenous Cultural Heritage Baseline Studies.....	14-6
14.1.8.1	<i>Previous Non-Indigenous Cultural Heritage Assessments</i>	14-6
14.1.8.2	<i>MEP Non-indigenous Cultural Heritage Field Survey Methodology</i>	14-7
14.1.8.3	<i>MEP Non-indigenous Cultural Heritage Field Survey Results</i>	14-8
14.1.9	Cultural Heritage Significance	14-9

14.1.9.1	Scientific (Archaeological) Significance	14-9
14.1.9.2	Social (Cultural) Significance	14-9
14.1.9.3	Non-Indigenous Cultural Heritage Significance.....	14-10
14.1.10	Potential Impacts and Mitigation Measures.....	14-10
14.1.10.1	Potential Impacts to Indigenous Cultural Heritage Values	14-10
14.1.10.2	Management Strategies for Indigenous Cultural Heritage Values.....	14-10
14.1.10.3	Cultural Heritage Management Plan (CHMP)	14-11
14.1.10.4	Potential Impacts to Non-Indigenous Cultural Heritage Values	14-12
14.1.10.5	Management Strategies for Non-Indigenous Cultural Heritage Values.....	14-12
14.2	REFERENCES	14-13
15.0	SOCIAL ENVIRONMENT	15-1
15.1	EXECUTIVE SUMMARY	15-1
15.1.1	Social Values.....	15-1
15.1.2	Potential Impacts and Mitigation Measures.....	15-1
15.2	INTRODUCTION	15-4
15.3	SOCIAL VALUES.....	15-4
15.4	METHODOLOGY	15-4
15.5	EXISTING SOCIAL ENVIRONMENT	15-5
15.6	POTENTIAL IMPACTS AND MITIGATION MEASURES	15-6
15.6.1	Demographic Change.....	15-7
15.6.2	Infrastructure and Services.....	15-7
15.6.3	Training and Employment.....	15-8
15.6.4	Housing and Accommodation.....	15-9
15.6.5	Community Values, Vitality and Lifestyle	15-10
15.6.6	Health and Social Services.....	15-11
15.6.7	Local Service Revenue	15-12
15.6.8	Local Land Use	15-13
15.6.9	Education	15-13
15.6.10	Mine Closure	15-14
15.6.11	Cumulative Impacts.....	15-14
15.7	MONITORING AND REPORTING	15-15
15.8	SUMMARY	15-16
15.9	REFERENCES.....	15-17
A-1	ANNEXURE A DRAFT SOCIAL IMPACT MANAGEMENT PLAN	A-1
16.0	HEALTH AND SAFETY	16-1
16.1	EXECUTIVE SUMMARY	16-1
16.1.1	Values.....	16-1
16.1.2	Issues.....	16-1
16.1.3	Mitigation Strategies.....	16-1

16.2	OVERVIEW	16-2
16.2.1	Health and Safety Management Plan	16-2
16.2.2	Legislation.....	16-3
16.2.3	Existing Community Values.....	16-5
16.3	HEALTH RISKS AND CONTROLS	16-5
16.3.1	Food Hygiene	16-8
16.3.2	Odour	16-8
16.3.3	Particulates and Vapours.....	16-8
16.3.4	Heat Stress	16-8
16.3.5	Noise and Vibration.....	16-8
16.3.6	Exposure to Chemicals.....	16-9
16.3.7	Disease Vectors.....	16-9
16.3.8	Potable Water Supply	16-10
16.3.9	Use of Process Water.....	16-10
16.3.10	Pest Management.....	16-10
16.3.11	Wildlife Hazards	16-10
16.3.12	Waste	16-10
16.3.13	Groundwater Quality	16-10
16.3.14	Surface Water Quality.....	16-11
16.3.15	Traffic Accidents	16-11
16.3.16	Train Load-Out Facility	16-11
16.4	SAFETY RISKS AND CONTROLS	16-11
16.4.1	Site Inductions.....	16-11
16.4.2	Fitness for Work Standards.....	16-12
16.4.3	Vehicle Management and Road Hazards.....	16-12
16.4.4	Physical Interaction with Mobile Equipment and Machinery	16-13
16.4.5	Fuel Storage and Handling	16-13
16.4.6	Power Infrastructure and High Voltage Exposure	16-14
16.4.7	Working at Heights and Falling Objects.....	16-14
16.4.8	Mine Blasting.....	16-14
16.4.9	Transportation.....	16-17
16.4.10	Spontaneous Combustion	16-17
16.4.11	Conveyors	16-17
16.4.12	Site Security	16-17
16.4.13	Personal Protective Equipment.....	16-18
16.5	DECOMMISSIONING AND REHABILITATION	16-18
16.6	CUMULATIVE HEALTH AND SAFETY RISKS.....	16-18
	ANNEXURE A-PEABODY CORPORATE FITNESS FOR WORK STANDARD	16-21
17.0	ECONOMICS	17-1

17.1	EXECUTIVE SUMMARY	17-1
17.2	VALUES	17-1
17.3	ISSUES	17-1
17.4	MITIGATION STRATEGIES	17-2
17.5	INTRODUCTION	17-2
17.6	ECONOMIC MODELLING METHODOLOGY	17-2
17.7	EXISTING ECONOMIC ENVIRONMENT	17-3
17.7.1	Jobs by Industry of Occupation.....	17-4
17.7.2	Types and Numbers of Businesses.....	17-5
17.7.2.1	Isaac LGA.....	17-5
17.7.2.2	Mackay LGA	17-5
17.7.3	Coal Mining.....	17-6
17.7.4	Mining and Support Services.....	17-6
17.7.5	Construction	17-7
17.7.6	Agriculture and Farming.....	17-7
17.7.7	Gas	17-8
17.7.8	Other Large Scale Developments.....	17-8
17.7.9	Value of Rateable Properties	17-10
17.8	POTENTIAL IMPACTS AND MITIGATION MEASURES	17-11
17.8.1	Phase One (2011-2015).....	17-11
17.8.2	Phase Two (2016-2027).....	17-13
17.8.3	Decommissioning.....	17-14
17.8.4	Local Significance	17-15
17.8.5	Employment.....	17-15
17.8.6	Local Businesses	17-16
17.8.7	Impact of Direct MEP- Related Employment	17-16
17.8.8	Impact of MEP-Stimulated Employment	17-17
17.8.9	Housing	17-17
17.8.10	Local Community Infrastructure and Services	17-18
17.9	REGIONAL SIGNIFICANCE.....	17-18
17.9.1	Coal Demand and Exports.....	17-18
17.10	COSTS TO GOVERNMENT.....	17-19
17.10.1	Rail	17-19
17.10.2	Port.....	17-19
17.10.3	Road.....	17-19
17.10.4	Water.....	17-19
17.10.5	Accommodation	17-19
17.11	GOVERNMENT REVENUES	17-20
17.11.1	Coal Royalties.....	17-20

17.11.2	Rail and Port Charges.....	17-20
17.11.3	State Payroll Tax.....	17-21
17.11.4	Local Government Revenue.....	17-21
17.11.5	Proposed Mineral Resource Rental Tax.....	17-22
17.11.6	Environmental Economic Impact.....	17-23
17.11.6.1	<i>Ecosystem Impacts.....</i>	<i>17-23</i>
17.11.6.2	<i>Comparison to Past Studies.....</i>	<i>17-23</i>
17.11.6.3	<i>As a Carbon Sink.....</i>	<i>17-23</i>
17.11.6.4	<i>Alternative Land Use.....</i>	<i>17-24</i>
17.11.7	Cumulative Impacts.....	17-25
17.12	CONCLUSIONS.....	17-25
17.12.1	Significant Economic Stimulus to the Economy.....	17-25
17.12.2	Minor Cost In Terms of Revenues Forgone.....	17-25
17.12.3	New jobs.....	17-25
17.12.4	Housing.....	17-25
17.12.5	Boost for Federal Government Revenue.....	17-26
17.12.6	Substantial Boost to Balance of Payments.....	17-26
17.12.7	Boost for State Government Revenue.....	17-26
17.13	REFERENCES.....	17-27
18.0	HAZARD AND RISK.....	18-1
18.1	EXECUTIVE SUMMARY.....	18-1
18.1.1	Values.....	18-1
18.1.2	Issues.....	18-1
18.1.3	Mitigation Strategies.....	18-1
18.2	HAZARD AND RISK SYSTEMS.....	18-1
18.2.1	Hazard Identification.....	18-2
18.2.2	Integrated Risk Management Plan.....	18-2
18.3	HAZARD AND RISK ASSESSMENTS.....	18-3
18.3.1	MEP Site.....	18-3
18.3.1.1	<i>Site Risk Register.....</i>	<i>18-11</i>
18.3.1.2	<i>Dangerous Goods and Hazardous Substances.....</i>	<i>18-11</i>
18.3.1.3	<i>Concentration of Raw Materials.....</i>	<i>18-12</i>
18.4	RAIL CORRIDOR-HAZARD AND RISK ASSESSMENT.....	18-14
18.5	EMERGENCY MANAGEMENT PLAN AND RESPONSE.....	18-14
19.0	TOR CROSS REFERENCE.....	19-1
20.0	ENVIRONMENTAL MANAGEMENT PLAN.....	20-1
20.1	INTRODUCTION.....	20-1
20.1.1	Purpose and Structure.....	20-1

20.1.2	The Project.....	20-1
20.1.3	Location.....	20-2
20.1.4	Project Proponent.....	20-2
20.1.5	Land Use and Tenure	20-3
20.1.6	Stakeholders	20-5
20.1.7	Standard Environmental Conditions	20-5
20.2	PROJECT DESCRIPTION.....	20-6
20.2.1	Description of the Project.....	20-6
20.2.2	Mining Sequence.....	20-6
20.2.3	Mine Rehabilitation.....	20-7
20.2.4	Mine Facilities and Infrastructure	20-8
20.2.5	Coal Processing and Handling	20-8
20.2.6	Rejects and Tailings Management.....	20-9
20.2.7	Water Management.....	20-9
20.3	ENVIRONMENTAL VALUES, IMPACTS, COMMITMENTS, AND DRAFT CONDITIONS.....	20-9
20.3.1	Content of the Section.....	20-9
20.3.2	General Conditions.....	20-11
20.3.2.1	<i>Background.....</i>	<i>20-11</i>
20.3.2.2	<i>Proposed Environmental Authority Conditions: Schedule A–General Conditions</i>	<i>20-11</i>
20.3.3	Air Quality	20-13
20.3.3.1	<i>Background.....</i>	<i>20-13</i>
20.3.3.2	<i>Environmental Value</i>	<i>20-13</i>
20.3.3.3	<i>Potential Impacts on the Environmental Value</i>	<i>20-13</i>
20.3.3.4	<i>Environmental Protection Objective</i>	<i>20-14</i>
20.3.3.5	<i>Control Strategies</i>	<i>20-14</i>
20.3.3.6	<i>Monitoring</i>	<i>20-15</i>
20.3.3.7	<i>Proposed Environmental Authority Conditions: Schedule B–Air.....</i>	<i>20-15</i>
20.3.4	Water Resources.....	20-17
20.3.4.1	<i>Background.....</i>	<i>20-17</i>
20.3.4.2	<i>Environmental Values.....</i>	<i>20-18</i>
20.3.4.3	<i>Potential Impacts on the Environmental Values.....</i>	<i>20-18</i>
20.3.4.4	<i>Proposed Environmental Protection Objectives.....</i>	<i>20-18</i>
20.3.4.5	<i>Control Strategies</i>	<i>20-18</i>
20.3.4.6	<i>Monitoring</i>	<i>20-20</i>
20.3.4.7	<i>Proposed Environmental Authority Conditions: Schedule C – Water.....</i>	<i>20-20</i>
20.3.5	Noise and Vibration.....	20-41
20.3.5.1	<i>Background.....</i>	<i>20-41</i>
20.3.5.2	<i>Environmental Value</i>	<i>20-41</i>

20.3.5.3	<i>Potential Impacts on the Environmental Value</i>	20-41
20.3.5.4	<i>Proposed Environmental Protection Objective</i>	20-42
20.3.5.5	<i>Control Strategies</i>	20-42
20.3.5.6	<i>Proposed Environmental Authority Conditions: Schedule D–Noise & Vibration</i>	20-42
20.3.6	Waste Management.....	20-45
20.3.6.1	<i>Background.....</i>	20-45
20.3.6.2	<i>Environmental Value</i>	20-45
20.3.6.3	<i>Potential Impacts on the Environmental Value</i>	20-45
20.3.6.4	<i>Proposed Environmental Protection Objective</i>	20-45
20.3.6.5	<i>Control Strategies</i>	20-45
20.3.6.6	<i>Monitoring</i>	20-46
20.3.6.7	<i>Proposed Environmental Authority Conditions: Schedule E–Waste Management.....</i>	20-47
20.3.7	Land Management.....	20-49
20.3.7.1	<i>Background.....</i>	20-49
20.3.7.2	<i>Environmental Values.....</i>	20-50
20.3.7.3	<i>Potential Impacts on Environmental Values</i>	20-50
20.3.7.4	<i>Proposed Environmental Protection Objectives.....</i>	20-51
20.3.7.5	<i>Control Strategies</i>	20-51
20.3.7.6	<i>Proposed Environmental Authority Conditions: Schedule F–Land.....</i>	20-54
20.3.8	Cultural Heritage.....	20-59
20.3.8.1	<i>Background.....</i>	20-59
20.3.8.2	<i>Environmental Value</i>	20-59
20.3.8.3	<i>Potential Impacts on the Environmental Value</i>	20-59
20.3.8.4	<i>Proposed Environmental Protection Objective</i>	20-59
20.3.8.5	<i>Control Strategies</i>	20-60
20.3.8.6	<i>Proposed Environmental Authority Conditions–Schedule G Cultural Heritage.....</i>	20-60
20.3.9	Community	20-61
20.3.9.1	<i>Background.....</i>	20-61
20.3.9.2	<i>Environmental Value</i>	20-61
20.3.9.3	<i>Potential Impacts on the Environmental Value</i>	20-61
20.3.9.4	<i>Proposed Environmental Protection Objective</i>	20-61
20.3.9.5	<i>Commitments.....</i>	20-62
20.3.9.6	<i>Proposed Environmental Authority Conditions: Schedule H–Community.....</i>	20-62
20.3.10	Environmental Management.....	20-63
20.3.10.1	<i>Monitoring</i>	20-63
20.3.10.2	<i>Reporting.....</i>	20-63

20.3.10.3 Environmental Management System	20-63
20.3.10.4 Research	20-63
20.3.10.5 Staff Training	20-64
20.3.10.6 Environmental Auditing and Review	20-64
20.4 REFERENCES	20-66
20.5 DEFINITIONS	20-67
21.0 COMMITMENTS NOT INCLUDED IN THE EM PLAN	21-1
21.1 INTRODUCTION	21-1
21.2 REFERENCES	21-7
22.0 REFERENCES	22-1

FIGURES

Figure 4-1 Regional Location of the MEP	4-3
Figure 4-2 Mines in the MEP Vicinity	4-4
Figure 4-3 Local MEP Area	4-5
Figure 4-4 Potential Sterilisation of Coal Resources.....	4-12
Figure 4-5 MEP Indicative Process Flow-sheet.....	4-15
Figure 4-6 Existing Millennium Mine Infrastructure.....	4-18
Figure 5-1 Mining Stage Plan1-2011	5-13
Figure 5-2 Mining Stage Plan 2-2012	5-14
Figure 5-3 Mining Stage Plan 3-2015	5-15
Figure 5-4 Mining Stage Plan 4-2020	5-16
Figure 5-5 Mining Stage Plan 5- End of Mining 2027	5-17
Figure 5-6 Final Landuse – End of Mining 2027	5-27
Figure 6-1 Average Monthly Rainfall and Temperature (1972-2010)	6-2
Figure 7-1 Soil Mapping Units in the MEP area	7-15
Figure 7-2 Overall Pre-Mining Grazing Land Suitability for the MEP Area	7-18
Figure 7-3 Overall Pre-Mining Cropping Land Suitability for the MEP area	7-19
Figure 7-4 Location of Homesteads near the MEP.....	7-31
Figure 7-5 Final Landuse – End of Mining 2027	7-38
Figure 8-1 Roads Associated With the MEP	8-5
Figure 8-2 Traffic Census Data.....	8-6
Figure 8-3 Section Breakdown for Road Transport Assessment	8-10
Figure 8-4 MAC Coppabella Accommodation Camp	8-14
Figure 8-5 Millennium Mine Access Rd/Peak Downs Highway-Existing Intersection Layout ..	8-17
Figure 8-6 Moranbah Access Road/Peak Downs Highway- Existing Intersection Layout	8-18

Figure 8-7	Maloney Street/Peak Downs Highway – Existing Intersection Layout	8-19
Figure 8-8	Norwich Park Rail System	8-21
Figure 8-9	Transport Infrastructure	8-27
Figure 9-1	Waste Management Locations for the MEP.....	9-20
Figure 10-1	Fitzroy River Basin.....	10-7
Figure 10-2	Local Catchment Areas.....	10-8
Figure 10-3	18 Month Sample of Streamflow Record: Isaac River at Deverill	10-12
Figure 10-4	DERM Streamflow Gauges in the Vicinity of MEP	10-13
Figure 10-5	Isaac River–Proportion of Water use by Type.....	10-16
Figure 10-6	Existing Water Storages at Millennium Coal Mine.....	10-18
Figure 10-7	Historic Flood Events-Isaac River at Goonyella Gauging Station.....	10-20
Figure 10-8	Historic Flood Events-Isaac River at Deverill Gauging Station.....	10-20
Figure 10-9	Flood Modelling Showing Existing Millennium Mine Operations Outside the 100 Year ARI Flood Extent from New Chum Creek.....	10-22
Figure 10-10	Regional Surface Geology.....	10-24
Figure 10-11	Surrounding Groundwater User and Monitoring Bore Locations.....	10-26
Figure 10-12	2012 Water Management System Layout.....	10-36
Figure 10-13	2015 Water Management System Layout.....	10-37
Figure 10-14	2020 Water Management System Layout.....	10-38
Figure 10-15	2027 Water Management System Layout.....	10-39
Figure 10-16	Proposed Flood Protection and Scour Protection Works.....	10-46
Figure 10-17	Impact on New Chum Creek Flood Levels-100 year AR.....	10-47
Figure 10-18	MEP Water Management System Schematic	10-49
Figure 10-19	Proposed Monitoring Points	10-51
Figure 10-20	Location of Final Voids Compared to PMF Flood Extent	10-55
Figure 10-21	Modelled Behaviour of Final Void–Mavis Pit.....	10-56
Figure 10-22	Modelled Behaviour of Final Void–Millennium Pit.....	10-57
Figure 10-23	Conceptual Groundwater Model	10-60
Figure 10-24	Geometry of the 3-D Conceptual Model	10-62
Figure 10-25	Simulated Millennium Mine and the MEP Pit Inflows	10-63
Figure 10-26	Groundwater Drawdown Year 5 -Rangal Coal Measures.....	10-65
Figure 10-27	Groundwater Drawdown Year 10 –Rangal Coal Measures.....	10-66
Figure 10-28	Groundwater Drawdown Year 15 –Rangal Coal Measures.....	10-67
Figure 10-29	Groundwater Drawdown End of Mine Life–Rangal Coal Measures.....	10-68
Figure 10-30	Hydrograph of Predicted Groundwater Drawdown	10-70
Figure 10-31	Groundwater Level Recovery, Post Mining	10-75
Figure 10-32	Proposed Groundwater Monitoring Bore Locations	10-78
Figure 10-33	Neighbouring Mining Activities.....	10-81
Figure 11-1	Homesteads in the MEP Vicinity	11-5

Figure 11-2 Measured Atmospheric Dust Concentration at Winchester Downs Homestead .	11-6
Figure 11-3 Measured Atmospheric Dust Concentration at Wotonga Homestead	11-6
Figure 11-4 Case 1 PM2.5 24 hr Maximum	11-13
Figure 11-5 Case 1 PM2.5 Annual Average	11-14
Figure 11-6 Case 1 PM10 5th Highest 24 hr Average	11-15
Figure 11-7 Case 1 TSP Annual Average	11-16
Figure 11-8 Case 1 TSP Annual Average in mg/m ² /day.....	11-17
Figure 11-9 Case 2-PM2.5 24 hr Maximum	11-18
Figure 11-10 Case 2 PM2.5 Annual Average	11-19
Figure 11-11 Case 2 PM10 5th Highest 24 hr Average	11-20
Figure 11-12 Case 2 TSP Annual Average	11-21
Figure 11-13 Case 2 TSP Annual Average in mg/m ² /day.....	11-22
Figure 12-1 Homesteads in the Vicinity of the MEP	12-6
Figure 12-2 Case 1 Day Meteorology	12-11
Figure 12-3 Case 1 Evening Meteorology.....	12-12
Figure 12-4 Case 1 Night Meteorology.....	12-13
Figure 12-5 Case 1 Night with Wind Meteorology	12-14
Figure 12-6 Case 2 Day Meteorology	12-15
Figure 12-7 Case 2 Evening Meteorology.....	12-16
Figure 12-8 Case 2 Night Meteorology.....	12-17
Figure 12-9 Case 2 Night with Wind Meteorology	12-18
Figure 12-10 Blast Overpressure Noise Contours.....	12-21
Figure 12-11 Blast Vibration Contours.....	12-22
Figure 13-1 MEP Vegetation Survey Locations.....	13-4
Figure 13-2 Certified Regional Ecosystems (DERM Mapping).....	13-6
Figure 13-3 Field Verified RE Mapping (RE Type)	13-7
Figure 13-4 Fauna Survey Locations on the MEP	13-31
Figure 13-5 Effect of Habitat Diversity on Movement Rates Through Corridors (QDMR, 2000)	13-36
Figure 13-6 Number of Macroinvertebrates in the MEP Area, March 2009.....	13-41
Figure 13-7 Number of Macroinvertebrate Families Within the MEP Area, March 2009.....	13-41
Figure 13-8 Number of fish caught and species richness by site during the March 2009 surveys of the MEP area.....	13-43
Figure 13-9 Relative Proportion of Fish Species Recorded Across the MEP Area, March 2009.....	13-43
Figure 13-10 Proposed Vegetation Loss	13-46
Figure 13-11 Ecological Corridor Values for the MEP	13-53
Figure 14-1 MEP Native Title Claims.....	14-5
Figure 16-1 Location of Homesteads Near the MEP	16-7

Figure 16-2	Hazardous Materials Storage Locations.....	16-16
Figure 17-1	Industry of Occupation for Isaac and Mackay1	17-4
Figure 17-2	Industry of Occupation for Mackay Region.....	17-4
Figure 17-3	Breakdown of the Isaac Region's Gross Regional Product by Sector.....	17-6
Figure 17-4	Monthly Prices for Hard Coking Coal.....	17-18
Figure 20-1	Millennium Coal Mine and Proposed MEP.....	20-4
Figure 20-2	Environmental Monitoring Points.....	20-21

TABLES

Table 2-1	Summary Table of Legislative Requirements.....	2-11
Table 4-1	Sediment Dam Characteristics	4-6
Table 4-2	MEP Land Tenures and Landowners	4-8
Table 4-3	Peabody Energy-SEC Resources and Reserves.....	4-10
Table 4-4	Expected Equipment Type.....	4-13
Table 4-5	Summary of Potential Evaluation and Exploration Activities.....	4-16
Table 4-6	Final Land Use and Rehabilitation Approval Schedule.....	4-27
Table 5-1	Post-Mining Landform Design Criteria.....	5-11
Table 5-2	Erosion Controls for Mining Activities.....	5-20
Table 5-3	Rehabilitation Success Criteria for Native Bushland.....	5-24
Table 5-4	Rehabilitation Success Criteria for Grasslands Suitable for Grazing.....	5-25
Table 5-5	Pre-and Post-Mining Land Use.....	5-26
Table 6-1	Climate Averages–Moranbah Weather Station	6-1
Table 6-2	Rainfall Records.....	6-3
Table 7-1	MEP Tenures and Land Owners.....	7-4
Table 7-2	Regional Stratigraphy.....	7-5
Table 7-3	Previous Soil Surveys of Relevance to the MEP	7-8
Table 7-4	Soil Mapping Units and MEP Area	7-11
Table 7-5	Land Suitability Classes	7-16
Table 7-6	MEP Land Suitability Classifications – Cropping and Grazing	7-17
Table 7-7	Salinity ranking based on EC1:2 measurements.....	7-22
Table 7-8	Drill hole details.....	7-23
Table 7-9	Number of Overburden Samples Collected for Major Lithologies of the MEP Stratigraphic Sequence.....	7-23
Table 7-10	Typical Geochemical Classification Criteria Based on NAPP and NAG Test Data.....	7-24
Table 7-11	Acid Potential Results – MEP Overburden Samples.....	7-25
Table 7-12	Heavy metal concentrations in overburden samples	7-26

Table 7-13	Change in Land Suitability for Grazing - MEP	7-39
Table 7-14	Soil Stripping Depth Guidelines - MEP	7-41
Table 7-15	Susceptibility of Soils to Erosion	7-42
Table 7-16	Erosion Controls for Mining Activities	7-43
Table 7-17	Environmentally Relevant Activities at the MEP	7-44
Table 8-1	Peak Downs Highway - Background Traffic Volumes	8-4
Table 8-2	Existing 2008 Equivalent Standard Axles	8-7
Table 8-3	Background Traffic Volumes	8-7
Table 8-4	Millennium-Poitrel Mine Access Road – Employee Requirements	8-8
Table 8-5	Summary of MEP assumptions and road sections	8-9
Table 8-6	Heavy Vehicle Movement Description–MEP	8-11
Table 8-7	Annual Heavy Vehicle Generation	8-12
Table 8-8	Equivalent Standard Axles Generation	8-12
Table 8-9	Workforce and Shift Requirements (Averaged)	8-13
Table 8-10	BIBO Trip Generation–Mackay to MAC Coppabella Accommodation Camp	8-15
Table 8-11	Employee Daily Trip Generation to and from MEP	8-15
Table 8-12	Link Impact Assessment	8-16
Table 8-13	Intersection Impact Assessment	8-17
Table 8-14	Cumulative Transport Impacts	8-26
Table 9-1	Waste Management: Operation Phase	9-7
Table 9-2	Waste Management: Decommissioning Phase	9-15
Table 9-3	MEP Waste Management Practice and Strategies	9-18
Table 9-4	Proposed Use of Cleaner Production Techniques for the MEP	9-22
Table 10-1	MEP Environmental Values	10-4
Table 10-2	Geomorphological Description of Streams	10-11
Table 10-3	Regional Surface Water Quality Monitoring Locations	10-14
Table 10-4	Queensland Water Quality Guidelines for Central Coast, Upland Streams	10-14
Table 10-5	Comparison of Regional Water Monitoring Results	10-15
Table 10-6	Existing Surface Water Extraction Licences	10-16
Table 10-7	Range of pH and EC Results for Millennium Mine Water Storages	10-17
Table 10-8	Model Parameters for New Chum Creek Flood Modelling	10-19
Table 10-9	Summary of Stratigraphic Sequence	10-23
Table 10-10	Groundwater Levels within Surrounding Permian Registered, Landholder and Monitoring Bores	10-25
Table 10-11	Surrounding Registered, Landholder and Monitoring Bore Details	10-29
Table 10-12	Rangal Coal Measures Aquifer Electrical Conductivity and pH On-site	10-30
Table 10-13	Rangal Coal Measures Aquifer Groundwater Quality Compared with Adopted Guidelines	10-31
Table 10-14	Environment Values of the Rangal Coal Measures Aquifer Resource	10-34

Table 10-15 Sediment Dam Characteristics	10-42
Table 10-16 Catchment Interception and Reduction in Runoff.....	10-44
Table 10-17 Modelled Sediment Dam Overflow Characteristics*	10-44
Table 10-18 Summary Average Annual Water Balance (High Runoff)	10-50
Table 10-19 Proposed Water Management Monitoring Points.....	10-52
Table 10-20 Groundwater Inflow Rates into the MEP Pits.....	10-63
Table 10-21 Predicted Groundwater Drawdown in the Rangal Coal Measures	10-71
Table 10-22 Proposed Groundwater Monitoring Program	10-77
Table 11-1 Properties Adjacent to the Site	11-4
Table 11-2 Measured Existing Air Quality at Homesteads Adjacent to the MEP.....	11-4
Table 11-3 Modelling Parameters for Case 1 and Case 2.....	11-9
Table 11-4 Dust Emissions for Main Dust Activities in Tonnes/Annum (excluding Pit retention factor)	11-10
Table 11-5 Dust Emissions for Main Dust Sources in Tonnes/Annum (including Pit Retention Factor)	11-11
Table 11-6 Predicted Dust Concentration and Dust Deposition for Sensitive Receptors (Including Assumed Ambient Levels) – Case 1	11-11
Table 11-7 Predicted Dust Concentration and Dust Deposition for Sensitive Receptors (including assumed ambient levels) – Case 2.....	11-12
Table 11-8 Dust Mitigation Measures	11-24
Table 11-9 Greenhouse Gas Emissions for Life of Mine (Scope 1 Emissions).....	11-26
Table 11-10 Greenhouse Gas Emissions for Life of Mine (Scope 2 and 3 Emissions).....	11-27
Table 12-1 Acoustic Quality Objectives for Dwellings During the Day (7am-6pm), Evening (6pm-10 pm) and Night (10pm-6am).....	12-3
Table 12-2 Homesteads in the MEP Vicinity	12-5
Table 12-3 Summary of Maximum Noise Levels From Mining Equipment.....	12-8
Table 12-4 Equipment List for MEP Noise Modelling.....	12-9
Table 12-5 Noise Level Goals for Out-of-Pit Emplacement Phase	12-10
Table 12-6 Noise Level Goals for In-Pit Emplacement Phase	12-10
Table 12-7 Night-time Low Frequency Noise Levels for Both Mining Phases.....	12-19
Table 13-1 Existing Mapped Regional Ecosystems within the MEP area	13-8
Table 13-2 Vegetation Communities of the MEP Area	13-11
Table 13-3 Habitat preferences for EVR species known to occur in the MEP vicinity	13-28
Table 13-4 Listed Weed Species Observed Within the MEP	13-29
Table 13-5 Terrestrial Vertebrate Sampling Techniques.....	13-29
Table 13-6 MEP Vertebrate Diversity in Comparison to Local Studies.....	13-34
Table 13-7 Likelihood of EVR Vertebrates Within the MEP	13-35
Table 13-8 Macrophyte species recorded at the Daunia Site-2009.....	13-38
Table 13-9 Macroinvertebrate Abundance within the MEP area, March 2009.....	13-40

Table 13-10	Potential freshwater fish within the Isaac-Connors Rivers System.....	13-42
Table 13-11	Remnant Vegetation Areas Designated for Clearing for Pit and Waste Rock Emplacements	13-47
Table 14-1	Findings from Previous Non-Indigenous Cultural Heritage Assessments.....	14-7
Table 15-1	Summary of Potential Social Impacts and Mitigation	15-1
Table 16-1	Legislative Requirements and Compliance	16-4
Table 16-2	Summary of Risks to MEP Personnel and Nearby Sensitive Receptors.....	16-6
Table 16-3	MEP Cumulative Assessment of Health and Safety Risks	16-19
Table 17-1	Business Count by Industry for the Isaac and Mackay Regions	17-5
Table 17-2	Regional Development Economic Development Corporation, May 2010 -Developments by Category (AUD Million of Dollars)	17-8
Table 17-3	Recent Major Projects within the Region	17-9
Table 17-4	Median Property Prices.....	17-10
Table 17-5	Median Weekly Rent for the Mackay Region	17-11
Table 17-6	Net Annual Mine Expenditure and Jobs during Phase One.....	17-12
Table 17-7	MEP Phase One-Annual Economic Impact, Isaac LGA.....	17-12
Table 17-8	MEP Phase One- Annual Economic Impact, Mackay/Whitsunday Region.....	17-13
Table 17-9	MEP Phase Two-Regional Annual Mine Expenditure and Jobs.....	17-13
Table 17-10	MEP Phase Two-Annual Economic Impact, Isaac LGA.....	17-14
Table 17-11	MEP Phase Two-Annual Economic Impact, Mackay/Whitsunday Region.....	17-14
Table 17-12	Additional Wage Income Generation within the Isaac Region.....	17-17
Table 17-13	Additional Coal Exports Attributed to MEP	17-19
Table 17-14	Additional Coal Royalties to the Queensland Government1.....	17-20
Table 17-15	Additional Income to Rail and Port Authorities.....	17-21
Table 17-16	Additional State Payroll Taxes to the Queensland Governmen.....	17-21
Table 18-1	Potential Hazards Identified for the MEP	18-3
Table 18-2	Consequence and Likelihood Table.....	18-4
Table 18-3	MEP Risk Assessment Matrix.....	18-4
Table 18-4	Preliminary Hazard Analysis for MEP Construction and Operations.....	18-5
Table 18-5	Preliminary Hazard Analysis-Decommissioning phase	18-9
Table 18-6	Indicative List of Dangerous Goods and Hazardous Substances.....	18-13
Table 18-7	Qualitative Assessment of Risk for Potential Rail Related Incidents	18-14
Table 18-8	Emergency Plan Elements for Mine-Site Related Emergencies.....	18-16
Table 19-1	TOR Cross Reference	19-1
Table 20-1	Millennium Coal Mine and MEP Tenures and Land Owners.....	20-3
Table 20-2	Contaminant Release Points, Sources and Receiving Waters.....	20-20
Table 20-3	Contaminant Release Limits	20-22
Table 20-4	Release Contaminant Trigger Investigation Levels	20-23
Table 20-5	Contaminant Release during Flow Events	20-24

Table 20-6	Water Storage Monitoring	20-26
Table 20-7	On-site Water Storage Contaminant Limits	20-26
Table 20-8	Receiving Waters Contaminant Trigger Levels	20-27
Table 20-9	Receiving Water Upstream and Down Stream Monitoring Points.....	20-27
Table 20-10	Stock Water Release Limits.....	20-30
Table 20-11	Irrigation Water Release Limits.....	20-30
Table 20-12	Groundwater Monitoring Locations and Frequency	20-33
Table 20-13	Groundwater Contaminant Trigger Values	20-34
Table 20-14	Location of regulated dams.....	20-37
Table 20-15	Basic Specification of Regulated Dams).....	20-37
Table 20-16	Hydraulic Performance of Regulated Dams	20-37
Table 20-17	Noise limits	20-43
Table 20-18	Airblast Overpressure Level	20-44
Table 20-19	Work Areas In Nature Conservation Areas	20-55
Table 21-1	Commitments Not Included in the EM Plan.....	21-2

PLATES

Plate 7-1	Existing view from the Annandale Homestead towards the MEP	7-33
Plate 7-2	Existing view from the Moorvale Property towards the MEP	7-33
Plate 7-3	Existing view from the Wotonga Homestead towards the MEP	7-34
Plate 7-4	Existing view from the Olive Downs Homestead	7-34
Plate 7-5	Existing view from the Daunia Homestead towards the MEP	7-35
Plate 7-6	Existing view from the Mavis Downs Homestead	7-35
Plate 7-7	Existing view from the Winchester Homestead	7-36
Plate 7-8	Current View of the MEP from the Annandale and Moorvale Access Roads.....	7-48
Plate 7-9	Modelled 3D View of the MEP from the Annandale and Moorvale Access Road	7-48
Plate 7-10	Current View of the MEP from the Millennium Poitrel Access Road	7-49
Plate 7-11	Modelled 3D View of the MEP from the Millennium Poitrel Access Road	7-49
Plate 10-1	New Chum Creek in the Vicinity of the MEP Area,	10-9
Plate 10-2	New Chum Creek in the Vicinity of the MEP Area, Location B (2009).....	10-9
Plate 14-1	Blaze Tree–Red Mountain.....	14-8

APPENDICES**VOLUME 3**

Final Terms of Reference	A
Approvals.....	B
Study Team	C
The Standard Criteria.....	D
Consultation Report.....	E
Soils	F1
Transport	F2

VOLUME 4

Surface Water	F3
Groundwater	F4
Air	F5
Noise	F6
Terrestrial Ecology	F7
Aquatic Ecology.....	F8
Indigenous Cultural Heritage.....	F9
European Cultural Heritage	F10
Social	F11
Economics	F12
